Claims:

1. A method of enhancing two-dimensional contrast and range images rendered from three-dimensional streak tube imaging lidar (STIL) data that is generated by a STIL camera system, comprising the steps of:

providing rendered contrast image data and rendered range image data, wherein each of said rendered contrast image data and said rendered range image data comprise pixels of data that comprise an image;

scaling an intensity value associated with each pixel of data in said rendered contrast image data based on a mean intensity value of all pixels of data in said rendered contrast image data, wherein first interim contrast image data is created;

re-scaling said first interim contrast image data to a predetermined dynamic range, wherein second interim contrast image data is created;

modifying said second interim contrast image data to compensate for jitter and charge coupled device (CCD) array effects associated with the STIL camera system, wherein third interim contrast image data is created;

re-scaling said third interim contrast image data to said predetermined dynamic range, wherein fourth interim contrast image data is created;

normalizing said fourth interim contrast image data using an exponential decay function that describes contrast intensity roll-off associated with said fourth interim contrast image data, wherein fifth interim contrast image data is created;

modifying said rendered range image data to compensate for jitter effects associated with the STIL camera system, wherein first interim range image data is created;

modifying portions of said first interim range data indicative of background in an image formed by said first interim range data to compensate for CCD array effects and range intensity roll-off associated with the STIL camera system, wherein second interim range image data is created;

applying a noise reduction routine to said second interim range image data to assign a revised intensity value to pixels of data from said second interim range image data failing noise criteria defined by said noise reduction routine, wherein third interim range image data is created; and

applying a histogram clip routine to said fifth interim contrast image data and said third interim range image data, wherein enhanced contrast image data and enhanced range image data, respectively, are created.

2. A method according to claim 1 wherein said step of scaling comprises the step of applying a $\log_{10}$ scaling routine to each pixel of data in said rendered contrast image data.

3. A method according to claim 1 wherein each said step of re-scaling comprises a linear operation.

4. A method according to claim 1 wherein said step of modifying said second interim contrast image data comprises the steps of:

generating a column profile from said second interim contrast image data, said column profile defined as an array of values with each one thereof being an average intensity taken along a column of pixels of data from said second interim contrast image data;

normalizing said second interim contrast image data using said column profile, wherein normalized image data is created;

generating a row profile from said normalized image data, said row profile defined as an array of values with each one thereof being an average intensity taken along a row of pixels of data from said normalized image data;

applying a first smoothing routine to said row profile,

wherein a smoothed row profile is created;

generating smoothed image data by multiplying said normalized image data by said smoothed row profile and then dividing by said row profile;

un-normalizing said smoothed image data using said column profile, wherein un-normalized image data is created;

applying a second smoothing routine to said column profile, wherein a smoothed column profile is created; and

generating said third interim contrast image data by multiplying said un-normalized image data by said smoothed column profile and then dividing by said column profile.

5. A method according to claim 1 wherein said step of modifying said rendered range image data comprises the steps of:

generating a column profile from said rendered range image data, said column profile defined as an array of values with each one thereof being an average intensity taken along a column of pixels of data from said rendered range image data;

normalizing said rendered range image data using said column profile, wherein normalized image data is created;

generating a row profile from said normalized image data, said row profile defined as an array of values with

each one thereof being an average intensity taken along a row of pixels of data from said normalized image data;

applying a smoothing routine to said row profile, wherein a smoothed row profile is created;

generating smoothed image data by adding said normalized image data and said smoothed row profile to form a sum, and then subtracting said row profile from said sum; and

un-normalizing said smoothed image data using said column profile, wherein said first interim range image data is created.

6. A method according to claim 5 wherein said step of modifying portions of said first interim range data comprises the steps of:

selecting pixels from said smoothed image data that satisfy a predetermined intensity criteria indicative of said background, wherein said pixels so-selected define a background mask;

generating a modified column profile from said smoothed image data using said background mask, wherein only pixels in said smoothed image data identified by said background mask are used to generate said modified column profile; and

normalizing said smoothed image data using said modified column profile, wherein said second interim range

data is created.

7. A method according to claim 1 wherein said noise reduction routine is a salt and pepper noise reduction routine.

8. A method according to claim 1 wherein said histogram clip routine is an adaptive scheme that adjusts, for said fifth interim contrast image data, clipping thresholds based on pixel intensity distribution of said fifth interim contrast image data, and that adjusts, for said third interim range image data, clipping thresholds based on pixel intensity distribution of said third interim range image data.

9. A method of enhancing two-dimensional contrast and range images rendered from three-dimensional streak tube imaging lidar (STIL) data that is generated by a STIL camera system that utilizes left and right cameras to generate the STIL data, comprising the steps of:

providing rendered contrast image data and rendered range image data generated from the STIL data, wherein each of said rendered contrast image data and said rendered range image data comprise pixels of data that comprise an image;

adjusting each of said rendered contrast image data and said rendered range image data to account for (i) missing columns of pixels of data due to defects in the left and right cameras, and (ii) differences in image background intensity between images generated by the left and right cameras due to differences between the left and right cameras, wherein equalized contrast image data and equalized range image data, respectively, are created;

scaling an intensity value associated with each pixel of data in said equalized contrast image data based on a mean intensity value of all pixels of data in said equalized contrast image data, wherein first interim contrast image data is created;

re-scaling said first interim contrast image data to a predetermined dynamic range, wherein second interim contrast

image data is created;

modifying said second interim contrast image data to compensate for jitter and charge coupled device (CCD) array effects associated with the STIL camera system, wherein third interim contrast image data is created;

re-scaling said third interim contrast image data to said predetermined dynamic range, wherein fourth interim contrast image data is created;

normalizing said fourth interim contrast image data using an exponential decay function that describes contrast intensity roll-off associated with said fourth interim contrast image data, wherein fifth interim contrast image data is created;

modifying said equalized range image data to compensate for jitter effects associated with the STIL camera system, wherein first interim range image data is created;

modifying portions of said first interim range data indicative of background in an image formed by said first interim range data to compensate for CCD array effects and range intensity roll-off associated with the STIL camera system, wherein second interim range image data is created;

applying a noise reduction routine to said second interim range image data to assign a revised intensity value to pixels of data from said second interim range image data

failing noise criteria defined by said noise reduction routine, wherein third interim range image data is created;

applying a histogram clip routine to said fifth interim contrast image data and said third interim range image data, wherein enhanced contrast image data and enhanced range image data, respectively, are created; and

applying an overlap correction routine to each of said enhanced contrast image data and said enhanced range image data to eliminate columns of pixels of data indicative of an overlapping field-of-view between the left and right cameras.

10. A method according to claim 9 wherein said step of scaling comprises the step of applying a $\log_{10}$ scaling routine to each pixel of data in said rendered contrast image data.

11. A method according to claim 9 wherein each said step of re-scaling comprises a linear operation.

12. A method according to claim 9 wherein said step of modifying said second interim contrast image data comprises the steps of:

generating a column profile from said second interim contrast image data, said column profile defined as an array

of values with each one thereof being an average intensity taken along a column of pixels of data from said second interim contrast image data;

normalizing said second interim contrast image data using said column profile, wherein normalized image data is created;

generating a row profile from said normalized image data, said row profile defined as an array of values with each one thereof being an average intensity taken along a row of pixels of data from said normalized image data;

applying a first smoothing routine to said row profile, wherein a smoothed row profile is created;

generating smoothed image data by multiplying said normalized image data by said smoothed row profile and then dividing by said row profile;

un-normalizing said smoothed image data using said column profile, wherein un-normalized image data is created;

applying a second smoothing routine to said column profile, wherein a smoothed column profile is created; and

generating said third interim contrast image data by multiplying said un-normalized image data by said smoothed column profile and then dividing by said column profile.

13. A method according to claim 9 wherein said step of

modifying said equalized range image data comprises the steps of:

generating a column profile from said equalized range image data, said column profile defined as an array of values with each one thereof being an average intensity taken along a column of pixels of data from said equalized range image data;

normalizing said equalized range image data using said column profile, wherein normalized image data is created;

generating a row profile from said normalized image data, said row profile defined as an array of values with each one thereof being an average intensity taken along a row of pixels of data from said normalized image data;

applying a smoothing routine to said row profile, wherein a smoothed row profile is created;

generating smoothed image data by adding said normalized image data and said smoothed row profile to form a sum, and then subtracting said row profile from said sum; and

un-normalizing said smoothed image data using said column profile, wherein said first interim range image data is created.

14. A method according to claim 13 wherein said step of modifying portions of said first interim range data comprises

the steps of:

selecting pixels from said smoothed image data that satisfy a predetermined intensity criteria indicative of said background, wherein said pixels so-selected define a background mask;

generating a modified column profile from said smoothed image data using said background mask, wherein only pixels in said smoothed image data identified by said background mask are used to generate said modified column profile; and

normalizing said smoothed image data using said modified column profile, wherein said second interim range data is created.

15. A method according to claim 9 wherein said noise reduction routine is a salt and pepper noise reduction routine.

16. A method according to claim 9 wherein said histogram clip routine is an adaptive scheme that adjusts, for said fifth interim contrast image data, clipping thresholds based on pixel intensity distribution of said fifth interim contrast image data, and that adjusts, for said third interim range image data, clipping thresholds based on pixel intensity distribution of said third interim range image

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